What are scenarios and why are they used?

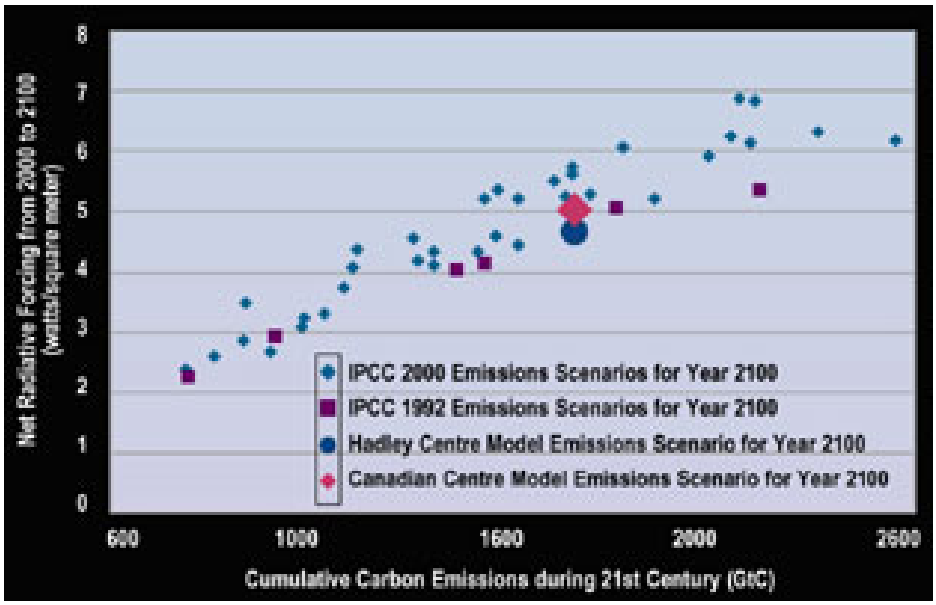
Scenarios are plausible alternative futures -- each an example of what might happen under particular assumptions. Scenarios are not specific predictions or forecasts. Rather, scenarios provide a starting point for examining questions about an uncertain future and can help us visualize alternative futures in concrete and human terms. The military and industry frequently use these powerful tools for future planning in high-stakes situations. Using scenarios helps to identify vulnerabilities and plan for contingencies.

Why are climate scenarios used in this Assessment and how were they developed?

Because we cannot predict many aspects of our nation's future climate, we have used scenarios to help explore US vulnerability to climate change. Results from state-of-the-science climate models and data from historical observations have been used to generate a variety of such scenarios. Projections of changes in climate from the Hadley Centre in the United Kingdom and the Canadian Centre for Climate Modeling and Analysis served as the primary resources for this Assessment. Results were also drawn from models developed at the National Center for Atmospheric Research, NOAA's Geophysical Fluid Dynamics Laboratory, and NASA's Goddard Institute for Space Studies.

For some aspects of climate, virtually all models, as well as other lines of evidence, agree on the types of changes to be expected. For example, all climate models suggest that the climate is going to get warmer, the heat index is going to rise, and precipitation is more likely to come in heavy and extreme events. This consistency lends confidence to these results.

For some other aspects of climate, however, the model results differ. For example, some models, including the Canadian model, project more extensive and frequent drought in the US, while others, including the Hadley model, do not. The Canadian model suggests a drier Southeast in the 21st century while the Hadley model suggests a wetter one. In such cases, the scenarios provide two plausible but different alternatives. Such differences can help identify areas in which the models need improvement.



The Assessment's Emissions Scenario Falls in the Middle of the other IPCC Emissions Scenarios

The graph shows a comparison of the projections of total carbon dioxide emissions (in billions of metric tons of carbon, GtC) and the human-induced warming influence due to all the greenhouse gases and sulfate aerosols for the emissions scenarios prepared by the Intergovernmental Panel on Climate Change (IPCC) in 1992 and 2000. As is apparent from the graph, both the emissions scenario and the human-induced warming influence assumed in this Assessment lie near the mid-range of the set of IPCC scenarios. Further detail can be found in the Climate chapter in the Foundation report [PDF file].

What assumptions about emissions are in these two climate scenarios?

Because future trends in fossil fuel use and other human activities are uncertain, the Intergovernmental Panel on Climate Change (IPCC) has developed a set of scenarios for how the 21st century may evolve. These scenarios consider a wide range of possibilities for changes in population, economic growth, technological development, improvements in energy efficiency, and the like. The two primary climate scenarios used in this Assessment are based on one mid-range emissions scenario for the future that assumes no major changes in policies to limit greenhouse gas emissions.

Some other important assumptions in this scenario are that by the year 2100:

- world population will nearly double to about 11 billion people;
- the global economy will continue to grow at about the average rate it has been growing, reaching more than ten times its present size;
- increased use of fossil fuels will triple CO2 emissions and raise sulfur dioxide emissions, resulting in an atmospheric CO2 concentration of just over 700 parts per million; and
-

total energy produced each year from non-fossil sources such as wind, solar, biomass, hydroelectric, and nuclear will increase to more than ten times its current amount, providing more than 40% of the world's energy, rather than the current 10%.

How is the Likelihood of Various Impacts Expressed?

To integrate a wide variety of information and differentiate more likely from less likely outcomes, the National Assessment Synthesis Team (NAST) developed a common language to express the team's considered judgment about the likelihood of results. The NAST developed its collective judgments through discussion and consideration of the supporting information. Historical data, model projections, published scientific literature, and other available information all provided input to these deliberations, except where specifically stated that the result comes from a particular model scenario. In developing these judgments, there were often several lines of supporting evidence (e.g., drawn from observed trends, analytic studies, model simulations). Many of these judgments were based on broad scientific consensus as stated by well-recognized authorities including the IPCC and the National Research Council . In many cases, groups outside the NAST reviewed the use of terms to provide input from a broader set of experts in a particular field.